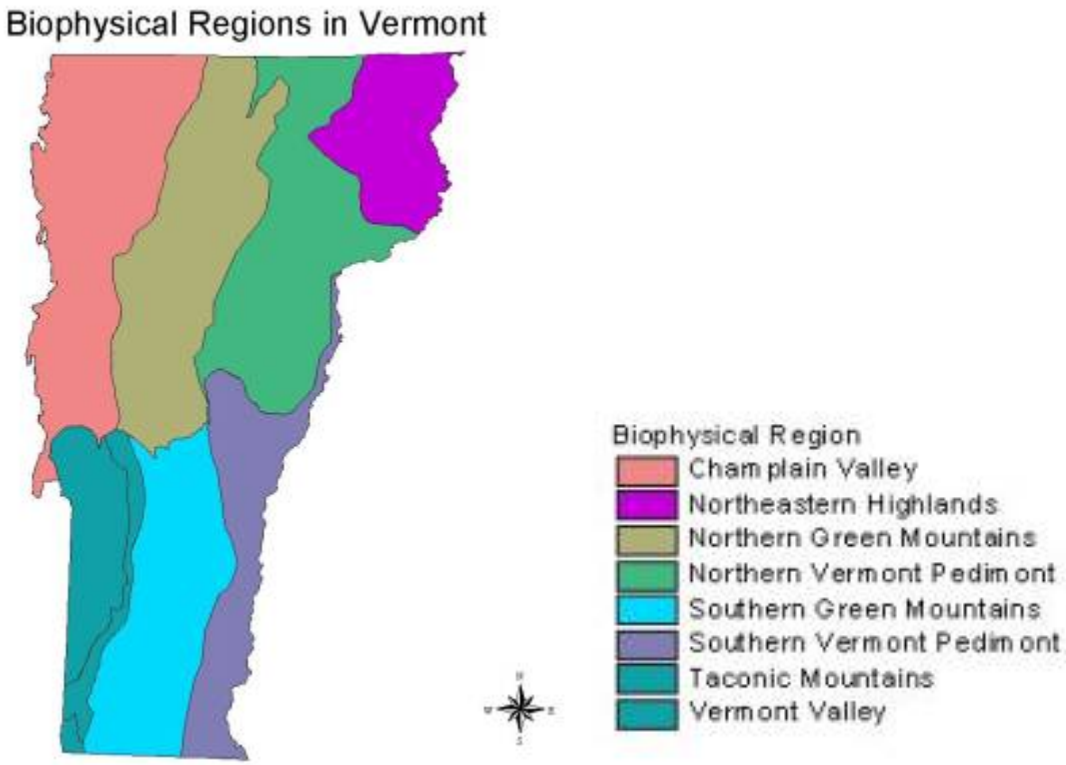
Chapter 3. AFFECTED ENVIRONMENT

3.1 Climate, Meteorology, and Air Quality

3.1.1 Climate

The climate of northern Vermont is characterized by cool summers and cold winters. The Northern Loop Project is located in two different biophysical regions of Vermont (VForE, 1997; see map below and description at http://vmc.snr.uvm.edu/summary/biophysicalregions.htm); the "Northern Vermont Piedmont" region, which includes St. Johnsbury Substation, Irasburg Substation and Mosher's Tap; and the "Champlain Valley," where Highgate Substation and St. Albans Tap are located.



The moderating influence of Lake Champlain ameliorates climatic conditions in northwestern Vermont versus areas east of the Green Mountains, so the Champlain Valley region experiences a longer frost-free period during late Spring, Summer, and early Fall.

St. Albans has a frost-free growing season of 154 days, while the Newport area (Mosher's Tap) experiences a frost-free growing season of only 130 days and St. Johnsbury has only a 123-day growing season (NOAA, 2003). In the Champlain Valley, mean January temperatures are 18°-20°F, and mean July temperatures are higher than 70°F. In the Northern Vermont Piedmont, mean January temperatures are in the range of 14°-16°F in the Newport area and 16°-18°F at St. Johnsbury. Mean July temperatures are 66°-68°F in the Newport area and 68°-70°F at St. Johnsbury (Wheaton, 1972).

3.1.2 Meteorology

The long-term (1961-1990) precipitation average was below 36 inches per year at St. Albans Bay and Highgate, 36 to 40 inches per year at St. Johnsbury, and 40 to 44 inches per year in the Newport area. (NOAA, 2003). Winter precipitation is normally in the form of snow, with occasional severe ice-storm conditions at both low and high elevations.

The ice storm of January 1998 was particularly noteworthy in its effects, especially at low elevations (below 200 feet) in the Champlain Valley and at high elevations (1900–2800 feet) in the Green Mountains. During that storm, severe icing conditions occurred at St. Albans and at Highgate but not in the Irasburg-Coventry-Newport region or at St. Johnsbury. In some areas,

more than 3 inches of ice accumulated on all surfaces, especially tree branches (every twig was encased in ice) and power lines.

Approximately 15 to 18% of Vermont forests were damaged by that storm, with over 700,000 acres affected in Vermont and about 17,000,000 acres affected regionally (VforE, 1998; FPR, 2003; USFS, 2003; DeGaetano, 2000). Many trees were severely damaged, losing 50% or more of their crowns.

Power transmission and distribution in the region, including much of northern New England, New York, and adjacent areas of Québec, were massively interrupted, and social services were strained to their utmost. Some areas in adjacent Québec did not regain power for up to six weeks. This storm has been considered the major natural ecological disturbance of the past century in northern New England.

3.1.3 Air Quality

Air-quality issues in northern Vermont relate primarily to long-distance transport of pollution from industrial facilities, particularly from coal-fired power plants in the Midwest. Northern Vermont typically receives airborne pollutants from the Ohio Valley and the southern Great Lakes region (Schictel & Husar, 1998). Such imported emissions result in significant acid-rain conditions in portions of the state, with effects notably greater at higher elevations than the proposed project facilities (Pembrook, 2001).

Some pollutants, however, derive from in-state sources. According to the 1998 Air Toxics Report (VTAC, 1998), "[L]ocal emissions exceeding the proposed revised standards are benzene, 1,3-butadiene, formaldehyde, methylene chloride, and acrolein. Sources of emissions for these compounds are automobiles, gas stations, industry including incinerators and wood-processing plants, wood stoves, furniture strippers, and garages." Other toxicants either do not exceed standards or do so by a combination of local and imported sources.

St. Johnsbury: There are no identified air-quality problems at this site. Being on the outskirts of the large village of St. Johnsbury, and near Interstate 93, it is likely that standards are occasionally exceeded.

Moshers Tap – Irasburg line: There are no identified air-quality problems on this corridor, although dust from local gravel and sand-extraction facilities may occasionally cause short-term localized problems.

Highgate: No air-quality problems have been identified at this site. Air pollution has been at issue recently in regard to some agricultural operations (specifically, a large egg farm) in the Highgate area, but the operations are not near the substation site.

St. Albans: No air-quality problems have been identified at this site.

3.2 Land Features and Use

3.2.1 Topography, Seismicity, Bedrock Geology and Soils

Topography

The project areas are located in different regions of the state. St. Johnsbury is in the eastern Vermont piedmont, characterized by rolling hills. This area is in the Connecticut River watershed.

The Newport area is in the Lake Memphremagog basin, also characterized by rolling hills but of somewhat less relief. Lake Memphremagog is a large international body of water extending across the Canadian border; it drains north to the St. Lawrence River.

Both of these areas are east of the Green Mountains (maximum elevation: 4295 feet at Mt. Mansfield), which is the major topographical feature of the state.

The Highgate and St. Albans sites are in the Lake Champlain Valley, which is characterized by low ridges and hills with broad areas of intervening, nearly level, terrain. Lake Champlain is the dominant topographic feature of the region, at a normal level of about 95 feet. It is also an international waterbody and flows north to the St. Lawrence River.

St. Johnsbury: This site is located on rolling topography on the north slope of Fairbanks Hill (elevation 1778 feet), at an elevation of about 840 feet. The site has a north-facing aspect and slopes gradually down to the Moose River.

Mosher's Tap – Irasburg Corridor: This corridor is characterized by the relatively narrow, north-south trending valley of Stony Brook and bordered by low rolling hills. Some of the knolls and low hills along the valley walls are formed primarily from large, post-glacial sand deposits, while more elevated and steeper terrain, especially to the east and west of the valley, are more typically-formed hills. Cleveland Hill is the highest hill in the vicinity at about 1400 feet. Most of the project is located between 700 and 900 feet elevation; Irasburg Substation is at about 765 feet elevation. The corridor generally follows the side-slopes of the valley, with some segments along the valley floor.

Highgate: This site is on a plateau more than 100 feet above, and remote from, the Missisquoi River, which cuts a deep gorge through the plateau south of the project area. It is characterized by relatively level terrain at an elevation of about 290 feet. A steep-sided, narrow ravine is incised into the landscape south of the project site towards the Missisquoi River. The land falls gently to the north and west, and there is a small knoll near the northeast corner of the site.

St. Albans: The project site here is located on a low, west-facing hillside at an elevation of 320 feet. There is a ledge outcrop at the eastern edge of the corridor, and the land slopes from that point west toward Lake Champlain.

Seismicity

In general, northern Vermont experiences few earthquakes. None greater than 4.5 (on the Richter scale) have been recorded within 35 miles of the project during the period of observation (1924-

1989). An earthquake in 1934 at Dannemora, New York, about 35 miles west of St. Albans, registered 4.8; another, in 1973 at Beecher's Falls, Vermont, about 35 miles east of Newport, registered 4.0. (NESEC, 1989).

The earthquakes that were closest to the project were one in 1943 at 44° 54' N, 73° 6' W, near the Mississquoi River in Swanton and approximately 3.4 miles southwest of the Highgate Substation site, and one in 1905 at 44° 54' N, 72° 12W', at South Bay of Lake Memphremagog in Newport, approximately 2.9 miles from the northern end of the Moshers Tap-Irasburg corridor (Stover *et al.*, 1980). Both were Class IV on the Modified Mercalli scale[14] (Stover *et al.*, 1980).

Bedrock Geology and Soils

St. Johnsbury: The bedrock in the substation area is the Gile Mountain formation, described (Doll, 1961) as a "gray quartz-muscovite phyllite or schist" of Lower Devonian age. There are no exposures in the project area.

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14 In seismology a scale of seismic **intensity** is a way of measuring or rating the *effects* of an earthquake at different sites. The Modified Mercalli Intensity Scale is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end.

The Intensity Scale differs from the Richter Magnitude Scale in that the effects of any one earthquake vary greatly from place to place, so there may be many Intensity values (e.g.: IV, VII) measured from one earthquake. Each earthquake, on the other hand, should have just one Magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3).

Mosher's Tap – Irasburg Corridor: Bedrock along the project corridor consists of two mapped types (Doll, 1961). Most of the project occurs on the Waitsfield Formation, Ayers Cliff limestone member of middle and upper Silurian age. This is described as siliceous crystalline limestone containing thin bands of slate and phyllite. There are minor exposures near the northern end of the corridor.

In the westernmost segment of this corridor (i.e., on the western slope of the valley of Stony Brook), the project crosses the Northfield Formation of middle and upper Silurian age. This formation consists of dark gray to black quartzite-sericite slate or phyllite with fairly widely-spaced interbeds a few inches thick of siltstone and silty crystalline limestone like that of the Waitsfield Formation (Doll, 1961). No outcrops were observed.

The bedrock is overlain with glacial till and alluvium, with a minor glacial feature near and north of Irasburg Substation. This is an esker along the Barton River; it has been extensively quarried for sand and gravel.

Table 1.

Soils in the Mosher's Tap - Irasburg corridor.
(Data from NRCS ; 1997).

Primary agricultural soils	
Nicholville silt loam	3 - 8 % slope
Roundabout silt loam	0 - 5%
Buckland very fine sandy loam	8 - 15%
Adams loamy fine sand	3 - 8%
Sheepscot gravelly fine sandy loam	0 - 3%
Moosilauke very fine sand loam	0 - 5%
Other soils	
Irasburg loamy fine sand	15 - 25% slope
Buckland very fine sandy loam	8 - 15%
Buckland very fine sandy loam	35 - 60%
Adams loamy fine sand	8 - 15%
Adams loamy fine sand	15 - 25%
Adams loamy fine sand	25 - 60%
Colton-Duxbury complex	8 - 15%
Colton-Duxbury complex	15 - 25%
Salmon very fine sandy loam	25 - 50%

Soils are varied along the preferred route (Table 1), but are mostly fine sand, sandy loam, and silt. Many of the soils are considered primary agricultural soils, as defined in Vermont (SCS, 1985; NRCS, 1997). Approximately 35% of the corridor occupies lands with soils that are considered to have good agricultural potential, and about 52% of that amount (18%) is actually used for agricultural at present (Countryman Environmental, 2002, appended).

Highgate: The bedrock at this site is mapped (Doll, 1961) as the Highgate Formation of lower Ordovician age. The formation is described as banded blue limestone and calcareous slate with local lenses of limestone conglomerate. It is on the western limb of St. Albans synclinorium. There are no exposures at the site.

The soil at this site is mapped by the SCS (1979) as Raynham silt loam (3% to 8% slopes), a hydric soil. It has a productivity rating of 3W, i.e., of moderate productivity but with limitations due to a seasonal high water table.

St. Albans: Bedrock at this site is the Rugg Brook Formation of middle Cambrian age. This consists of sandy gray dolomite, dolomite conglomerate, and interbeds of gray-weathered sandstone in the St. Albans synclinorium. It is exposed in the woodland along the eastern edge of the field, adjacent to the project area.

The soil at this site is mapped by the SCS (1979) as Georgia extremely stony loam, 0 to 8 % slopes. This soil has limited uses due to stoniness, is not listed as a primary or secondary agricultural soil in Vermont (SCS, 1985), but, as noted, is currently farmed with a hay crop.

3.2.2 Agriculture

Agriculture in Vermont is predominantly dairy, with lands devoted primarily to growing feed crops (corn) and hay or in pasture. Horse farming is increasingly important. Other major crops in the state include maple sugar, apples, berry crops, and nursery crops.

St. Johnsbury: This site has no active agricultural use nearby, and nearby fields have been abandoned. There is a large dairy farm to the east of this site on Higgins Hill Road.

Mosher's Tap – Irasburg Corridor: A portion of this project crosses over areas that are currently farmed. Agriculture in this area is predominantly dairy, and the fields are cropped in hay or field corn or used as pasture. Most areas in current use are along the valley floor, not the sloping valley sides. Approximately three-eighths of a mile of corridor passes over active farmland, in three areas: these areas are predominantly in hay, with some corn and a minor area of pasture (and also immediately adjacent to active fields for approximately another three eights of a mile).

Many of the soils along this corridor are considered primary agricultural soils, as defined in Vermont (SCS, 1985; NRCS, 1997; Countryman Environmental, 2002; and see Table 1). As noted above, about 35% of the corridor has soils considered of good agricultural potential of which about half is in current use. Approximately 13 poles are located in areas now used for agriculture with another 27 located on soils of good agricultural potential but where agriculture has been abandoned or other uses are in place such as lawns. Most areas where agricultural uses have been abandoned are on sloping terrain, where previous use was pasture. These fields, outside of the maintained corridor, are now reverting to shrubs and forest.

Another agricultural use noted along this corridor is maple-syrup production (see below, Section 3.2.3, Forest Resources). At least two sugar operations are on lands adjacent to this corridor. In these areas, a sugarbush, i.e., a grove or forest of sugar maple (*Acer saccharum*), is tapped yearly

for production of maple syrup. Sap pipelines (2" black plastic pipe to transport liquid maple sap from the forest to the sugarhouses) cross the corridor in two locations.

Highgate: There is no agricultural use in the immediate project area. Just to the north of the site, i.e., north of the old railroad bed, is a pastured area and a dairy farm. VELCO's power lines pass over this pasture. The soil at this site would have agricultural potential if drained, but the site is probably too small to be farmed profitably.

St. Albans: The site of the St. Albans Tap is in the middle of a small field that is currently cropped with hay. Although the soil is not considered a primary or secondary agricultural soil due to stoniness, the soil is fertile and the hay crop appears to be valuable. The general landscape is agricultural, with woodlands on adjacent areas that are not tillable due to ledge outcrops.

3.2.3 Forest Resources

St. Johnsbury: This site is located in an old field area with no significant forest resources but is beginning to grow up to become a young forest. Small stands of white pine (*Pinus strobus*) occupy drier sites but, being open-grown, do not constitute a manageable resource. Northern white cedar (*Thuja occidentalis*) is colonizing the damp slope to the south of the substation, and the remaining forest cover is dominated by aspen (*Populus tremuloides*, *P. balsamifera*). No marketable timber occurs on the site.

Moshers Tap-Irasburg Corridor: The forest-products industry is an important one in the region. Forest trees in the project area are generally conifers, including fir (*Abies balsamea*), red spruce (*Picea rubens*), white spruce (*Picea glauca*), hemlock (*Tsuga canadensis*), and northern white cedar (*Thuja occidentalis*). Northern deciduous hardwoods are also important components of the forest, including sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), paper birch (*Betula papyrifera*) and white ash (*Fraxinus americana*).

However, much of this corridor is across farmland or abandoned farmland with little forest use, and other areas are occupied by alder swamps. Minor areas near the southern and northern ends have adjacent forest lands; as noted, the existing corridor is maintained in a cleared condition. There are small areas of plantations of white pine (*Pinus strobus*) and red pine (*Pinus resinosa*) at two locations adjacent to the cleared corridor.

Of note is the use of large stands of sugar maple for production of maple syrup; two such operations were noted near the proposed corridor, but the corridor does not bisect any operation. Most of the soils in the area are considered to be of moderate or moderately high productivity for forest trees; they have various limitations due to wetness, steep slopes, rockiness, or sandy texture (Table 2).

3.2.4 Earth Extraction

VELCO determined the existence of earth-extraction facilities by inspection of the project areas and conversations with land owners by VELCO representatives.

St. Johnsbury: There are no significant earth resources in the vicinity of the St. Johnsbury substation.

Mosher's Tap – Irasburg Corridor: For the most part, there are no significant earth resources in the vicinity of Irasburg Substation or the Mosher's Tap. However, just north of Irasburg Substation, the corridor passes across an area of glacially-deposited sand and gravel that has been extensively exploited in the past and that is being extracted in areas outside of the existing corridor. There are at present 8 poles located within the gravel "pit" area; a VEC substation is also located in this "pit" area.

Highgate: There are no significant earth resources in the vicinity of Highgate Substation.

St. Albans: There are no significant earth resources in the vicinity of St. Albans Tap. The bedrock at this site is dolomite, a rock that is occasionally quarried in western Vermont. It outcrops at the eastern edge of the corridor at this site. There are quarries at Fonda, a village in St. Albans approximately 4.5 miles north of the project location, but none in the project's immediate area.

3.2.5 Recreation

VELCO evaluated potential impacts on recreational sites by inspection of the project sites and adjacent lands.

St. Johnsbury: There are no recreational facilities or likelihood of recreational use at the St. Johnsbury facility. The area is on the outskirts of the village of St. Johnsbury, there may be some potential for hunting upland game or deer, but this is limited by proximity to Interstate 93 and other land uses.

Mosher's Tap – Irasburg Corridor: Regionally, recreation is very much related to boating and fishing on Lake Memphremagog and along the Black River. Because of the importance of the South Bay area of Lake Memphremagog for migratory waterfowl, duck hunting is also important. Upland game hunting, especially for tailed deer, is regionally important and locally popular. Winter recreation is popular, and snowmobiling is a regionally important use.

The main recreational opportunities along this corridor are fishing in Stony Brook and snowmobiling. Fishing is likely restricted to local use by fishermen on foot (the stream is too small to canoe), and the cold-water fishery in the stream is considered significant (L. Gerardi, Vermont Department of Fish and Wildlife, personal communication to Countryman Environmental). There are snowmobile trails maintained by the Vermont Association of Snowmobile Travelers (VAST) in the vicinity of the corridor, which may cross it in certain locations, but they are not along the corridor itself, being mostly across farm fields.

Highgate: Regional recreational opportunities are primarily associated with Lake Champlain, west of the project facility, and the Mississquoi River south of the project. There are no recreational facilities or likelihood of significant recreational use at the Highgate facility. The

nearby railroad bed is likely used for snowmobiling, however, and all-terrain-vehicle (ATV) users can access areas to the north by crossing near the two existing substations.

St. Albans: Regional recreation is strongly associated with Lake Champlain, where swimming, fishing, boating, and camping facilities are all located at St. Albans Bay. There are no recreational facilities or likelihood of recreational use at the St. Albans facility. It is remote enough from residences that there may be some hunting in the area. It cannot be seen from Lake Champlain, 9/10^{ths} of a mile distant.

3.2.6 Residential, Commercial and Industrial Impacts

VELCO evaluated potential impacts on residential, commercial and industrial uses by inspection of the project sites and by reviewing local plans.

St. Johnsbury: There are no such facilities within the immediate area of St. Johnsbury Substation, except Central Vermont Public Service Corporation's substation located on adjoining property. The closest residences to this site are single-family dwellings located approximately 1200 feet to the west, on Higgins Hill Road, and approximately 1200 feet to the east, also on Higgins Hill Road. The village of St. Johnsbury lies to the northwest of the site. The substation is already screened from these residences, and the project involves no change outside the existing fence (only within the already existing substation footprint) so there will be no additional impact to any neighbor.

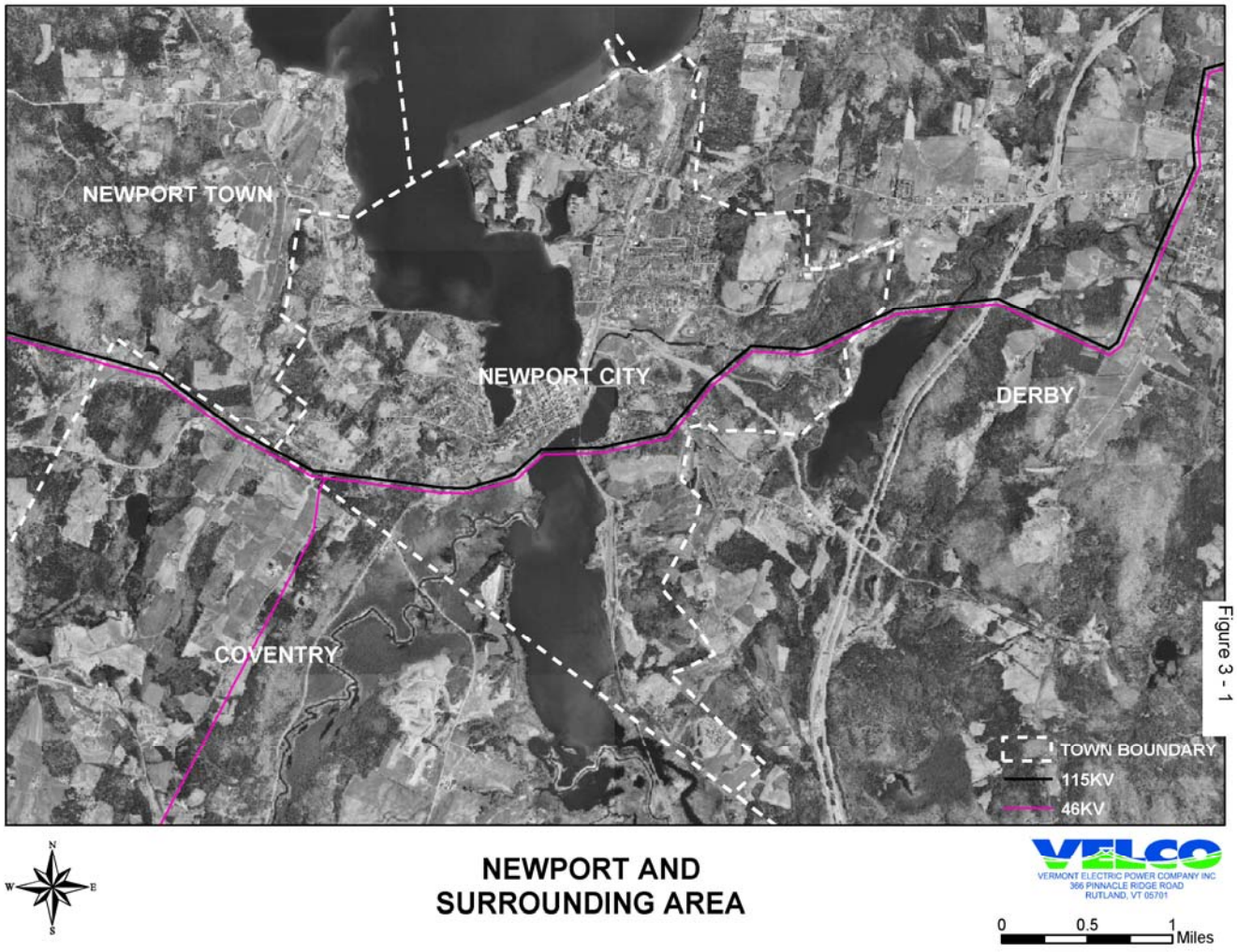
The closest commercial or industrial facilities are the Fairbanks Scale Company, approximately 3800 feet to the northeast, and the Maple Grove food-products facility, approximately 3200 feet to the northwest.

Mosher's Tap – Irasburg Corridor: The region of this project is mostly in an agricultural and forested area, with a rural residential area along Alder Brook Road. There are approximately 39 residences located within 500 feet of the corridor.

Most of these are along Alder Brook Road, Nadeau Road, and Mt. View Drive (north of the actual tap location). More distant residential areas include a rural residential area on Maple Ridge Road, the village of Coventry, and the City of Newport. Figure 3-1 is an aerial map of the Newport region.

Commercial land uses include sand and gravel extraction on lands owned by the State of Vermont (Agency of Transportation) and by Calkins Sand and Gravel Company near State Route 14 in Irasburg and the Citizens substation located in the aforementioned gravel-pit area. A "bed and breakfast" with a restaurant is located on Heermanville Road in Coventry, approximately 800 feet east of the project corridor. A church is located just north of the tap location at the intersection of Alder Brook Road and Route 105. Representatives of VELCO have had discussions with both the bed and breakfast owners and the Church, with regard to both explaining the project and obtaining VELCO easements. The Church has not signed an easement at this time as one issue remains unresolved. The owner of the bed and breakfast has not signed VELCO easement to date.

Figure 3-1.



Highgate: One residence is located 300 feet distant on the adjacent parcel to the east of the substation site. The substation is already screened from the one residence, and the area of enlargement is on the opposite side of the substation from the residence so it will not be any more visible to them.

Commercial property is located on the adjacent parcel west of the substation but is screened from the project area by a large patch of trees. The site is on the outskirts of the village of Highgate Center.

St. Albans: Only one residence is located within 1000 feet of this facility, a private residence about 400 feet to the northeast. The switching station will not be visible from the one residence.

There are no commercial or industrial uses in the project vicinity. The village of St. Albans Bay lies slightly less than a mile to the west, and the City of St. Albans lies approximately one mile to the east.

3.2.7 Airports, Navigation, Training Areas, Public Facilities and Other Land Uses

St. Johnsbury: A municipal water tower, supplying water to the village of St. Johnsbury, is located across Higgins Hill Road from the substation. A substation owned by Central Vermont Public Service Corporation is on adjacent property to the northwest. Also, the project is located near Interstate 93, upslope to the south.

Mosher's Tap – Irasburg Corridor: The Newport Airport in Coventry is approximately 1.3 miles from the project corridor. In line with the NW-SE runway, the project is approximately 1.8 miles northwest of the runway; in line with the NE-SW runway, the project is approximately 3.8 miles southwest of the runway. VELCO consulted a Federal Aviation Administration Advisory Circular and a local pilot who has knowledge of the airport, and both sources indicate that the

alignment of the proposed Irasburg-Mosher's Tap line will not interfere with airport operations (see Appendix D). VELCO will seek written confirmation. A water-storage tower for the City of Newport's municipal water system is located approximately 1900 feet to the northwest of the existing Mosher's Tap structure.

Highgate: The Franklin County State Airport lies 2.3 miles to the west of the substation. This facility has a N-S runway, parallel to the project power lines and not in line with the substation.

The project is adjacent to State Route 78; south of that road is the Highgate Converter Station, owned by the Highgate Joint Owners, operated by VELCO. The project is approximately 2300 feet from the Highgate Falls hydroelectric station (owned by Swanton Village, Inc.) on the Missisquoi River. In the village of Highgate Center are the Highgate schools and sports arena.

St. Albans: There are no facilities in the project vicinity.

3.3 Hydrology, Water Quality and Water Use

3.3.1 Surface Waters

St. Johnsbury: There are no surface waters near the St. Johnsbury facility. Site work for the facility intersects the local water table at about 5 feet below the original soil surface on the slope located on the south side of the substation; VELCO notes that this is a common occurrence with earthworks in Vermont's hilly terrain. As a result, there is groundwater discharge near the southeast corner of the facility, but the discharge is captured by a ditch and eventually infiltrates

back into the ground; that is, the lowest part of the 'cut bank' is seep but also vegetated, and while the volume of water is not great it is sufficient to maintain wetland vegetation along the toe of the bank and in the ditch. As this wet area is outside the substation fence and at the edge of the gravel pad, the potential for contamination is not significant.

Approximately 1900 feet west of the facility is a small permanent stream that is a tributary to the Moose River. A small seasonal stream, tributary to the above-named permanent stream and near the access road, flows approximately 800 feet north to its confluence with the permanent stream.

Stiles Pond (146 acres), which is the municipal water supply for St. Johnsbury, is located 2.5 miles east of the project site. It drains to the Moose River via Stiles Brook, east of the project site.

Mosher's Tap – Irasburg Corridor: Streams along this route are Ware Brook, an unnamed tributary to the Black River, several seasonal and permanent tributaries to Stony Brook and Alder Brook, and Stony Brook itself. The tap itself is located approximately 150 feet from Alder Brook. The corridor crosses over approximately six seasonal or small permanent streams that are tributaries to the above-named brooks. During construction, VELCO will use existing roads to access the corridor. As these roads have bridges where they cross some of the streams, there will be no impact on the streams themselves as construction vehicles and equipment will cross the streams using these bridges. These streams will not be impacted by this project (see memorandum from Art Gilman, Appendix F, and Vermont's Agency of Natural Resource CUD

permits item 5 (Appendix B), where it states that crossing will be only by existing bridges and farm roads).

The corridor more or less parallels the course of the Black River which flows north into Lake Memphremagog, an international waterbody. At its closest, near the south end of the corridor, the Black River is approximately 500 feet distant to the east. Much of the corridor is approximately 5000 feet distant from the Black River, which is beyond an intervening series of hills. At the north end of the corridor, the mouth of the Black River into Lake Memphremagog is approximately 1.1 miles east of the corridor.

Lake Memphremagog, the location of which is shown in Figure 1-1, is the major body of water in the region, covering some 6317 acres in the United States (VT AEC, 1981). It drains north to the St. Lawrence River. Ponds within 1.5 miles of the project area are Walker Pond, Sargent Pond, Smith Pond, and Kidder Pond, all less than 20 acres (VT AEC, 1981), and two small ponds on an unnamed tributary to Stony Brook; all lie west of the corridor. There are also farm ponds in the vicinity of Alder Brook Road, and three small dug ponds (i.e., two near Nadeau Road and one near Alder Brook Road) lie partially within the project corridor.

Highgate: Other than dug ditches, the only surface water on the site is a small pond, apparently a dug stormwater pond, near State Route 78. The project area drains to this pond and subsequently off-site via a culvert under Route 78. This culvert is the head of a seasonal stream that is a tributary to the Mississquoi River, approximately 4850 feet southwest of the substation area. Missisquoi Bay of Lake Champlain lies approximately 4 miles' distance to the northwest.

St. Albans: There are no surface waters in proximity to the St. Albans Tap site. The nearest surface water, an unnamed tributary to Lake Champlain, is approximately 1750 feet to the north. Lake Champlain itself is approximately 4800 feet west of the site.

3.3.2 Flood Waters

Approximately 3.5% of the state of Vermont is subject to flooding, with "2000 miles of major streams, and more than twice that number of smaller streams which periodically experience flooding" (Wernecke and Mueller, 1972). Lands along the shore of Lake Champlain are subject to annual inundation following spring snowmelt. Major rivers are sometimes subject to spring flooding, with problems developing especially from the formation of ice jams. Rivers also flood on occasion following prolonged heavy rains; this can occur in any season. A particular problem in Vermont is summertime flash-flooding, often following severe thunderstorms. This problem is especially noted in towns with hilly or mountainous terrain and narrow, steep-sided valleys.

St. Johnsbury: The project is not subject to floodwaters, being on elevated, sloping terrain.

Mosher's Tap – Irasburg Corridor: Following along the valley floor, a portion of this corridor at Ware Brook and segments along Stony Brook will be within the 100-year floodplain (FEMA, 1976). Pole placements will be designed to withstand flooding. Wood poles will be treated with pentachlorophenol, a treatment used by VELCO on all of its poles that has been approved by the EPA and the State of Vermont to withstand the impact of any flooding. The approximately 11 poles that may be constructed with Corten steel will not need any additional treatment or coating.

Highgate: The project area is not subject to floodwaters, being on elevated terrain more than 100' above the elevation of the Missisquoi River.

St. Albans: The project is not subject to floodwaters, being on elevated, sloping terrain more than 100' above the elevation of the nearest stream.

3.3.3 Ground Water and Water Supply

St. Johnsbury: Groundwater favorability is rated low in this region (SPO, 1972). The location is outside of the local water-supply-protection area.

Mosher's Tap – Irasburg corridor: Portions of the corridor are within areas of potential aquifer recharge with sandy or gravelly soils (SPO, 1972), including the Irasburg Substation site. There are no public water supplies within the corridor; a wellhead-protection area lies east of the corridor near Heermanville Road in Coventry.

Highgate: The Highgate Substation site is located in a potential aquifer-recharge area due to gravel underlayment (SPO, 1972). It is not within a public water-supply area. The closest public-water supplies are for Highgate Manor (3000' distant) and Highgate Center School (1600' distant).

St. Albans: The St. Albans Substation site is located within a potential bedrock aquifer-recharge area (SPO, 1972). It is not located within a public water-supply area.

3.3.4. Wetlands

In Vermont, wetlands are classified according to functions and values. As defined by the Vermont Water Resources Board, Class One wetlands are wetlands that are deemed as significant by the Board so "that they merit the highest level of protection." (Vermont Wetland Rules, 2001). There are no Class One wetlands affected by this project.

A Class Two wetland is one that appears on a National Wetland Inventory Map (1978) or is a wetland contiguous to a mapped wetland. Except for certain allowed uses, any development in a Class Two wetland, or its associated 50-foot buffer zone, requires a Conditional Use Determination ("CUD"). All other wetlands are Class Three wetlands not requiring a CUD for development.

St. Johnsbury: There are small areas, a few hundred square feet to approximately one acre, of wetland swales near St. Johnsbury Substation, notably, upslope to the south and in a small valley to the east. These were not delineated but were determined by inspection. These are classified (Cowardin et al., 1979) as palustrine forested (PFO) and palustrine emergent (PEM) wetland, respectively. There is also a small palustrine forested wetland, a few thousand square feet in size, in a small valley along a seasonal stream to the west, approaching the project area near the access road. These all drain northward to the Moose River. These wetlands are all outside the area of the proposed work, which will be within the existing substation's fence.

Mosher's Tap – Irasburg corridor: Wetlands along this corridor were delineated and are shown on the project site plans. See, in Appendix F, a memorandum (Countryman Environmental

2002b) detailing the delineations and functional evaluations of the wetlands on this corridor. Most of the wetlands on the project corridor are classed as palustrine scrub/shrub (PSS) or emergent wetlands (Cowardin et al., 1979). The scrub/shrub wetlands are predominantly alder swamps, and the emergent wetlands are mostly "wet meadows" in pasture or abandoned pasture. The corridor bisects some forested wetlands.

Highgate: A wetland at this site was delineated and is shown on the project site plans. This wetland is primarily palustrine scrub/shrub in nature, with some subordinate emergent and forested vegetation. This wetland is approximately 2 -3 acres in total size. Of this, 33,883 square feet (less than one acre) will be filled for the substation expansion as permitted by the Army Corps of Engineers under a General Permit (see Appendix B). The General Permit stated that "the work...will have minor individual and cumulative impacts on the waters and wetlands of the U.S." and made the project subject to the Corps' standard permit conditions for "Minimization of Environmental Impacts" that are part of the Vermont General Permit No. 58, i.e., Conditions 13-22 which among other provisions include requirements for avoidance or minimization of impact, stabilization of temporary fill, and erosion control (see Appendix B). Under the General Permit process, the Vermont Agency of Natural Resources commented on VELCO's application, raising no concerns in regard to wetlands functions and values, and the Corps imposed no special conditions.

St. Albans: There are no wetlands in the project vicinity, which is located in an upland field.

3.3.5 Water Quality

Water-quality issues in Vermont are related, as elsewhere, to wastewater, industrial pollution, stormwater runoff, land development, and agricultural operations. Waterbodies that do not meet Vermont Water Quality Standards (see Appendix F) were recently listed (VT DEC, 2000) as "impaired waters."

St. Johnsbury: There are no identified water-quality problems at this site, and it is not in the watershed of any impaired water.

Mosher's Tap – Irasburg Corridor: There are no identified water-quality problems along this corridor. It is likely that there is non-point-source runoff from agricultural operations that may affect water quality in Water Brook, Stony Brook, and receiving waters. Gravel-extraction operations near and along the project corridor have settling ponds that capture fine sediments.

The entire corridor is in the watershed of Lake Memphremagog (including South Bay), which is impaired due to excessive algal growth and nutrient enrichment.

Highgate: There are no identified water-quality problems at this site. It is in the watershed of the Missisquoi Bay of Lake Champlain, which is considered an impaired water due to elevated levels of mercury in walleye fish and phosphorous enrichment. In August 2003, Missisquoi Bay experienced a major algal bloom that resulted in beach closures and health warnings (Crawford, 2003).

St. Albans: There are no identified water-quality problems at this site. It is the watershed of St. Albans Bay of Lake Champlain that is considered impaired water due to elevated levels of mercury in walleye, elevated levels of polychlorinated biphenyl ("PCBs") in lake trout, and phosphorous enrichment.

3.4 Ecology

3.4.1 Vegetation/ Flora

Flora - Terrestrial/Uplands

The project is primarily located in the "northern hardwood forest" region of Vermont (Johnson, 1980), characterized by deciduous trees especially sugar maple (Acer saccahrum), beech (Fagus grandifolia), paper birch (Betula papyrifera) and yellow brich (Betula alleghaniensis). In this region there is also a significant component of conifers, especially balsam fir (Abies balsamea), hemlock (Tsuga canadensis) and red spruce (Picea rubens).

The St. Albans site and the Highgate sub site are located in the "northern hardwood - oak-hickory region" (Johnson, 1980), characterized by the presence of those two additional genera (*Quercus, Carya*).

The entirety of northern Vermont is located within the "conifer-deciduous association" of the eastern deciduous forest (Greller, 1988). The region is near the southern boundary of the boreal forest region, and portions of the region are mapped as "high elevation Appalachians" (Barbour and Christensen, 1993).

The terrestrial flora of the region is well-known (Fernald, 1950; Seymour, 1969) and is described below from field inspection by personnel of Countryman Environmental. The flora of Caledonia County (St. Johnsbury) was recently enumerated by Gilman (1999).

The natural communities of Vermont, including the common, matrix communities such as occur in the several project areas, are described by Thompson and Sorenson (2000).

St. Johnsbury: This area is on a hillside formerly used as upland pasture. Remnant fields are in hay species, and old field areas are being colonized by white pine (*Pinus strobus*) on drier areas and northern white cedar (*Thuja occidentalis*) on damper soils. Aspen (*Populus tremuloides, P. balsamifera*), maples (*Acer saccharum, A. rubrum*), elm (*Ulmus americana*), and birches (*Betula populifolia, B. papyrifera*) dominate the woodlot to the south.

Mosher's Tap – Irasburg Corridor: Lying near the Canadian border but at low elevation, the plant communities in this region are controlled by a combination of low winter temperatures, soil fertility and reaction (pH), and moisture. Forest trees in the project area are generally conifers, including fir (*Abies balsamea*), red spruce (*Picea rubens*), white spruce (*Picea glauca*), hemlock (*Tsuga canadensis*), and northern white cedar (*Thuja occidentalis*). Northern deciduous hardwoods are also important components of the forest, including sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*) paper birch (*Betula papyrifera*), and white ash (*Fraxinus americana*).

Non-forest upland communities in the corridor are primarily in early stages of "old field" succession and are at present dominated by pasture grasses, including timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), creeping red fescue (*Festuca rubra*) and Kentucky bluegrass (*Poa pratensis*). Brambles (*Rubus spp.*) are prominent. In some areas, especially on gravels and sands, clubmosses (*Lycopodium spp.*), bracken (*Pteridium aquilinum*) and other pteridophytes are common.

Highgate: The area of the Highgate Substation is on apparently-abandoned farmland, now significantly grown up (where vegetation has not been maintained within the power-line corridors) to an upland species of alder (*Alnus viridis* ssp. c*rispa*) and also to poplars (*Populus tremuloides*), willows and other shrubs and trees. A wetland in the vicinity of the substation expansion is dominated by willows and other shrubs. Surrounding lands include a patch of forest with paper birch (*Betula papryifera*) and white pine (*Pinus strobus*) and agricultural lands beyond an abandoned railroad bed.

St. Albans: The area of the St. Albans Tap is in a mowed field, apparently recently renovated and dominated by grasses including Hungarian brome (*Bromus inermis*) and red clover (*Trifolium pratense*). Adjacent forest is of a type adapted to dry, circumneutral soils including sugar maple (*Acer saccharum*), bitternut hickory (*Carya cordiformis*), hophornbeam (*Ostrya caroliniana*), etc.

Flora - Aquatic/Wetlands and Waterbodies

The composition of the aquatic and wetland flora of the project area is influenced by the generally cool summer temperatures of the region, water chemistry (in turn influenced by bedrock and surficial geology), and nutrient input from runoff (Hutchinson, 1975). In general, Lake Memphremagog and Lake Champlain are noted to have high diversity of aquatic species and robust wetland communities (e.g., Muenscher, 1930; Johnson, 1980) although aquatic weed problems, e.g., Eurasian water milfoil (*Myriophyllum spicatum*) are noted, especially in Lake Champlain (see related article in Appendix F). Also, see Section 3.3.5 (regarding water quality) for a description of recent algal blooms exacerbated by phosphorous loading.

Wetlands in this area are classified in accordance with Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al 1979).

St. Johnsbury: Wetlands in the vicinity are small palustrine forested and emergent. Forest trees include northern white cedar (*Thuja occidentalis*) and red maple (*Acer rubrum*); some quaking aspen (*Populus tremuloides*) also occur in the small wetland patches. Emergent plants include various sedges (*Carex spp*.), e.g., yellow sedge (*Carex flava*) and scabrate or seep sedge (*Carex scabrata*), marsh fern (*Thelypteris palustris*), horsetail (*Equisetum arvense*) and broad-leaved cat-tail (*Typha latifolia*).

Mosher's Tap – Irasburg Corridor: The larger wetlands along this project corridor are dominated by speckled alder (*Alnus rugosa*). Understory thickets are dominated by emergent

plants such as bluejoint grass (*Calamagrostis canadensis*), tall meadow rue (*Thalictrum polygamum*) and Joe Pye weed (*Eupatorium maculatum*). Some of the abandoned fields have a "wet meadow" community dominated by reed canary-grass (*Phalaris arundinacea*), red-top grass (*Agrostis gigantea*) and various sedges (*Carex spp.*) and bulrushes (*Scirpus spp.*)

Purely aquatic plants are confined to Alder Brook and include tape-grass (*Vallisneria americana*). Extensive aquatic-bed, emergent, and scrub/shrub wetland communities with many more species occur at South Bay of Lake Memphremagog.

Highgate: The wetland community, as documented by transect data for the required delineation, includes primarily alders, willows, aspen, and red maple with an understory of emergent herbaceous species, prominently sedges, grasses, and ferns. The small open pond, which is in the nature of a stormwater-retention pond, has some floating-leaved aquatic species, including duckweed (*Lemna minor*).

St. Albans: There are no wetland communities in the project vicinity.

3.4.2 Wildlife

The tables in Appendix F list species of mammals, birds, amphibians, and reptiles that are known or are likely to occur in the various project regions. Significant habitat maps, published by the Vermont Department of Fish and Wildlife (DFW, 1997), are also appended in Appendix F.

Wildlife-Terrestrial/Uplands

St. Johnsbury: St. Johnsbury Substation is on a terrace on a north-facing hillside within the curve of a local highway (Higgins Hill Road) and just down slope of Interstate 93. The area is characterized by small fields and woodlots typical of formerly active agricultural land. The nearest contiguous forest cover lies along the south bank of the Moose River, about 1000 feet to the north. Wildlife species in this area are likely limited to small mammals, with seasonal (summer) use by deer. There are no deer-wintering areas mapped by the Vermont Department of Fish and Wildlife near the substation.

Mosher's Tap – Irasburg Corridor: Wildlife within the project areas is typical for the region; no concentrations of wildlife or critical habitat, such as deer-wintering habitat, have been noted. The area includes forest and field at relatively low elevation. Common species include white-tailed deer, moose, snowshoe hare, coyote, fox, raccoon, and skunk as well as small mammals (see Appendix F). One area of deer-wintering habitat has been identified on the southeast edge of Cleveland Hill at the Coventry-Irasburg town line. This habitat is adjacent to the existing cleared corridor, but the corridor does not bisect it; it is the easternmost extension of an extensive deer-wintering area in the hills west of this corridor.

Highgate: The area of the Highgate Substation, constrained between a major road and an abandoned railroad and immediately adjacent to the already-developed substations, is not optimal for wildlife habitat. Some migratory songbirds were observed, notably red-winged blackbird and yellow-rumped warbler. Snipe were observed in a brushy field on the other side of the old railroad track. There may also be some amphibian use of the small stormwater pond in the lower area of the wetland; however, this would be limited to common species.

The Missisquoi River, which flows through a deep valley south of the substation site, likely serves as a wildlife corridor, especially for waterfowl and wading birds. However, the substation site is separated from the river by a state highway, a 1500'-wide terrace and steep slopes.

St. Albans: The area of the St. Albans Tap, being in the middle of a small field, likely has little wildlife use. A forested ridge running north-south parallels the power-line corridor to the west, representing the only sizeable woodland habitat in the area. Even so, area wildlife is likely to comprise only species common to field and forest habitats such as deer, small mammals, rodents, and insectivores along with common bird species.

Wildlife - Aquatic/Wetlands and Waterbodies

St. Johnsbury: There is no aquatic or wetland habitat in the vicinity of the St. Johnsbury Substation.

Mosher's Tap – Irasburg Corridor: Wetland-dependent wildlife, including beaver, mink, and muskrat, occur along Stony Brook. For migratory birds, the northern end of the power-line corridor is located approximately 0.43 miles west of the South Bay State Wildlife Management Area, on South Bay of Lake Memphremagog. South Bay is an attractant to, and sustains, large populations of migratory waterfowl. However, the crest of a ridge separates the project area from South Bay.

Alder swamps along Stony Brook appear to be good habitat for woodcock and certain migratory songbirds.

Fisheries in Stony Brook and Ware Brook are cold-water type, and the streams are considered important breeding habitat for anadromous rainbow and brown trout that access them from Lake Memphremagog. Landlocked salmon may also access these streams, but the streams are not managed for salmon by the Vermont Department of Fish and Wildlife.

Highgate: Some migratory songbirds were observed, notably red-winged blackbird and yellow-rumped warbler. Snipe were observed in a brushy field on the other side of the old railroad track, but the site itself is in too late of a successional state to receive use by snipe. Woodcock may be present. There may also be some amphibian use of the small stormwater pond in the lower area of the wetland; however, this would be limited to common species.

St. Albans: There is no aquatic or wetland habitat in the vicinity of the St. Albans project site.

3.4.3 Rare and Endangered Species

Threatened and Endangered Plants

St. Johnsbury: There are no occurrences of federally-listed threatened or endangered plants (50 CFR 17.11) within the project area. In Vermont, the listed species (see Appendix F) are small whorled pogonia (*Isotria medeoloides*), Jesup's milk-vetch (*Astragalus robbinsii* var. *jesupi*) and barbed-bristle bulrush (*Scirpus ancistrochaetus*); none are likely to occur within the project area. The first small whorled pogonia has historically only occurred only near Burlington (Jones, 1902), and the other two are confined to southeastern Vermont.

Also, no species that is listed as threatened or endangered under Vermont statute (10 Vermont Statutes Annotated, Chapter 123, as amended) exists at the St. Johnsbury Substation site or nearby. The current list of 152 species is appended. There is a historical record for ram's-head lady's-slipper (*Cypripedium arietinum*) approximately 3000 feet distant, but this plant has not recently been observed there (Countryman Environmental, personal observation). No species ranked as rare by the Vermont Department of Fish and Wildlife, Nongame and Natural Heritage Program ("NNHP") is known within the project vicinity.

Mosher's Tap – Irasburg Corridor: There are no occurrences of federally-listed threatened or endangered plants within the project area. One species that is listed as threatened in Vermont was noted at the Irasburg Substation site: Greene's rush (*Juncus greenei*). Plants inventoried in 2001 and in July 2003 by VELCO consultants occurred outside the proposed building envelope and will be avoided during construction. There are three plants immediately outside the existing fence. Another project being filed in the near future, which VELCO is associated with, will bring

another 48-kV line into the Irasburg substation and, in doing so, enlarge the footprint. In conjunction with this follow-up project, VELCO will need to acquire an Endangered Species Permit from the Vermont Agency of Natural Resources to transfer those three plants and develop a management program for all the other existing population (not in the area to be disturbed).

No other of the 152 species currently listed as threatened or endangered in Vermont (see Appendix F) or any that are ranked as rare by the NNHP are known to occur within the project area, although several occur at South Bay of Lake Memphremagog. The statutory list is currently undergoing revision, in which it is proposed to delist one species, the many leaved-rush (*Scirpus polyphyllus*), and to add another species, the dwarf water-lily (*Nymphaea leibergii*). Dwarf water-lily occurs in the Lake Memphremagog vicinity but not near or within the project area.

Highgate: There are no federally-endangered or state-listed species of plants known in the project vicinity or any that are ranked as rare by the NNHP. Rare plants in the region are found mostly along Lake Champlain or the Missisquoi River, remote from the project.

St. Albans: There are no federally-listed endangered or state-listed species of plants known in the project vicinity or any that are ranked as rare by the NNHP. Some are known at St. Albans Bay and headlands along Lake Champlain. A population of awned sedge (*Carex atherodes*) occurs in a wet meadow under VELCO power lines east of the tap towards St. Albans. Recently discovered in Vermont (Briggs, personal communication), this is the only station for the species in the state; it is not as yet ranked by the NNHP.

Threatened and Endangered Wildlife

No occurrences of federally-listed threatened or endangered fauna (50 CFR § 17.12) are known within or near the project areas (please refer to Appendix F). In Vermont there are six such species: eastern mountain lion (*Felis concolor couguar*), lynx (*Lynx canadensis*), Indiana bat (*Myostis sodalis*), bald eagle (*Haliaeetus leucocephalus*), Puritan tiger beetle (*Cicindela puritana*) and dwarf wedgemussel (*Alasmidonta heterodon*). These are briefly discussed below:

- Eastern mountain lion has recently been confirmed as a transient in northern Vermont; however, no resident individuals or breeding populations are known.
- Lynx has been historically known in Vermont; current populations occur in forested terrain remote from any of the project areas.
- In personal communication to Arthur Gilman, Susie van Ottingen, endangered-species specialist with the US Fish and Wildlife Agency, stated that the Indiana bat breeds in the southern Champlain valley, and while it is possible that it may also occur in the northern Champlain Valley, the Indiana bat is not known to occur in the Swanton and Highgate areas and is not likely to occur elsewhere in the project area; no records are known for the Indiana bat near the project elements, and no critical habitat (nesting or roosting trees, or hibernacula) for this species occurs on the involved project lands.
- Transient individuals of bald eagles may occur anywhere in northern Vermont. However, the species is not known to nest in Vermont (Crawford, 2003), and no other critical habitat, such as winter-feeding areas, is in the project area. A Bald Eagle Recovery Plan for Vermont is currently being developed (Crawford, 2003b, see Appendix F).

- Puritan tiger beetle is confined to habitats along the Connecticut River, remote from the project area (Leonard and Bell, 1999).
- Dwarf wedgemussel is also confined to the Connecticut River, remote from the project area (Fichetl and Smith, 1993).

There are 42 species of fauna listed as threatened or endangered under Title 10, Chapter 123 of the Vermont Statutes Annotated, as amended (see Appendix F). None of these are specifically known to exist in the project area. As noted, transient individuals of some mammals such as eastern mountain lion, lynx, marten (*Martes americana*), Indiana bat and some birds such as bald eagle, peregrine falcon (*Falco peregrinus*) and upland sandpiper (*Bartramia longicauda*) may also occur, but no critical habitat is known for these species on the project area (Countryman Environmental, 1997).

With these generalities in mind, the following site-specific notes are offered:

St. Johnsbury: This site is approximately 5.5 miles from the Connecticut River, where bald eagles are regularly observed.

Mosher's Tap – Irasburg Corridor: Upland sandpiper has regularly occurred in the project vicinity (Laughlin and Kibbe, 1984) and has been known to nest at the Newport Airport in Coventry; it is likely to occur in farm fields in the project vicinity. Some rare species, e.g.,

common loon (*Gavia immer*) and common tern (*Sterna hirundo*), occur at South Bay of Lake Memphremagog.

Highgate: Three species of mussels that are listed as endangered in Vermont occur in the Missisquoi River in Highgate (Fichtel and Smith, 1994), which is approximately 2300 feet from the Highgate Substation. These are cylindrical papershell (*Anodontoides ferussacianus*), pocketbook (*Lampsilis ovata*) and black sandshell (*Ligumia recta*), but only black sandshell is known historically from the area.

St. Albans: There is little potential for such species in this area.

3.4.4 Natural Areas

The State of Vermont's Department of Forests, Parks, and Recreation manages 33 designated "natural areas" (see Appendix F). Of these, none are within one mile of any of the project areas, the closest being Highgate Cliffs in Highgate approximately 4 miles distant from the project site in that town. Highgate Cliffs Natural Area is described as a "small headland on Missisquoi Bay" (FPR, 2003b).

Numerous other entities and authors have listed, or discussed, various "natural areas" in Vermont, all using somewhat subjective criteria. For example, the U.S. Environmental Protection Agency (EPA, 1987) listed priority wetlands in New England, including Lake Memphremagog, and VRC (1988) discussed a classification scheme for natural areas in the state. Other

publications include Vogelmann (1964, 1969) and Countryman (1972). None of the sites discussed in these publications, with the exception of Lake Memphremagog, are within one mile of any of the project sites.

The New England Natural Resources Center (NENRC, 1970 *et seq*.) listed numerous sites in Vermont. The following are those, exclusive of deer-wintering areas and archaeological sites, that are within one mile of the project areas, with one-line descriptions after NENRC:

St. Johnsbury: None

Mosher's Tap – Irasburg Corridor:

Black River Marsh -Extensive marsh supporting many wildlife species.

Newport Cliffs - Scenic cliffs.

South Bay, Lake Memphremagog - Narrows famous for salmon runs in spring.

Highgate:

Highgate Falls - Waterfalls and cascades of Missisquoi River (also see Jenkins and Zika, 1987, who describe it as "a wide gorge below a small dam and the remnants of a falls").

St. Albans: None.

More recently, Thompson and Sorenson (2000) have broadly evaluated Vermont's ecosystems and described 80 community types across the state. A number of these are ranked as rare. None of the project sites occur on habitats that would be so ranked under the system proposed by them.

3.5 Socioeconomics

All statistical information in this section was retrieved from the following web sites (see also the Reference section):

- Vermont Dept. of Employment and Training, at http://www.det.state.vt.us
- U.S. Census Bureau, at http://factfinder.census.gov
- The Vermont League of Cities and Towns, at http://www.vlct.org
- The Northeastern Vermont Development Association, at http://www.nvda.net
- The Northwest Regional Planning Commission, at http://www.nrpcvt.com

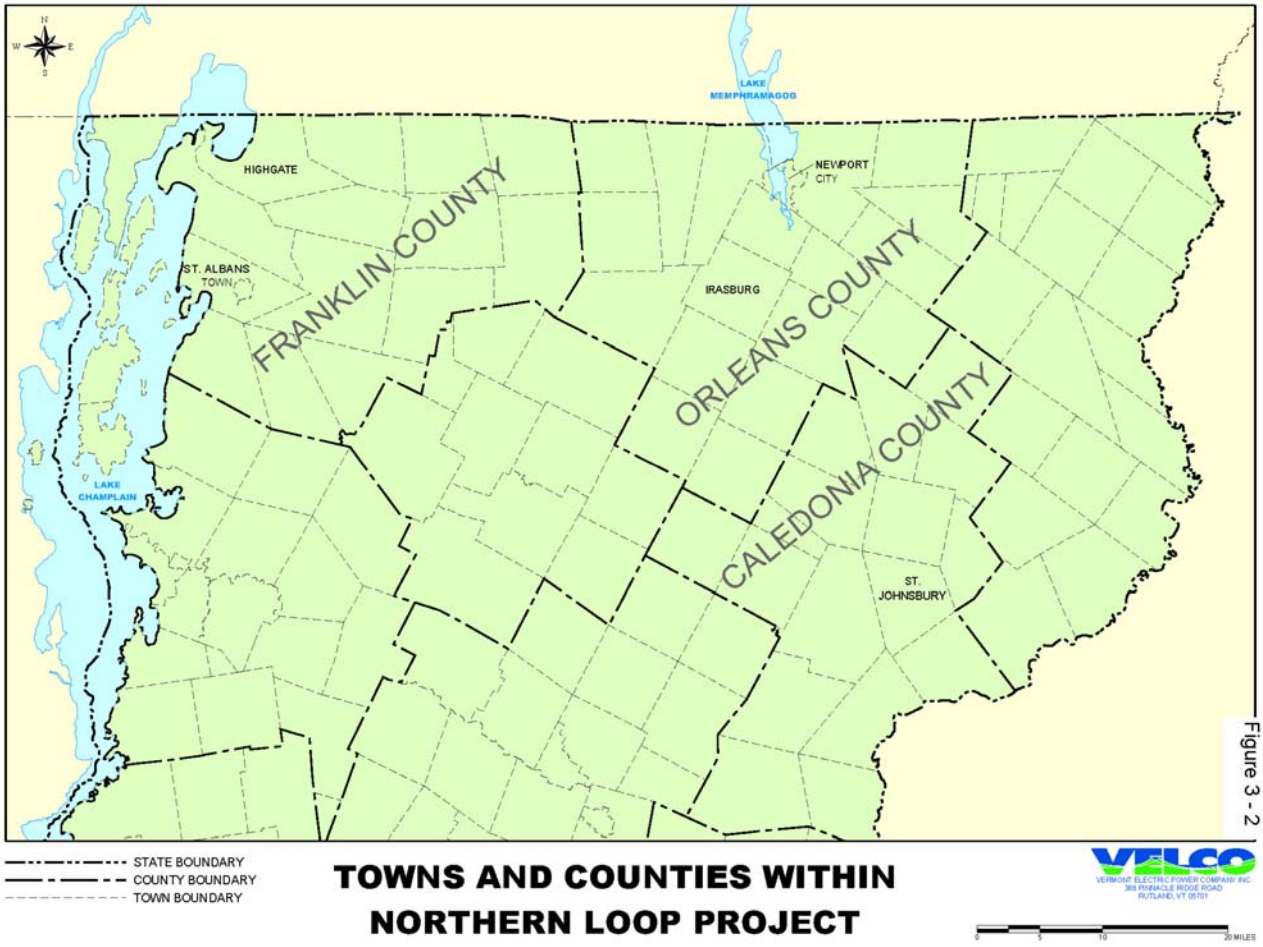
3.5.1 Institutional Setting

St. Johnsbury in Caledonia County, Coventry, Irasburg, and Newport City in Orleans County, and Highgate and St. Albans Town in Franklin County are organized towns/cities located in the northern part of Vermont. (See Figure 3-2.)

Organized towns in Vermont hold either town meetings or elections at which selectmen/aldermen are elected. These selectmen/aldermen are an administrative entity with

limited jurisdiction. They, in turn, appoint a planning commission, which may prepare and adopt a master plan for the town and review site plans and subdivisions.

Figure 3-2



St. Johnsbury, Coventry, and Newport City are served by both their individual planning commissions as well as by the Northeast Vermont Development Association. The Town of Irasburg has no town planner but is served by the Northeast Vermont Development Association. Highgate and St. Albans Town also have their own planning commissions and are served by the Northwest Regional Planning Commission.

3.5.2 Population

The counties of Caledonia, Essex and Orleans together are called the "Northeast Kingdom." Although the Northeast Kingdom makes up 21 percent of the land area of Vermont, only 10 percent of the state's population reside in this area. In 2000, the Town of St. Johnsbury had a population of 7571, Irasburg had 1077, Newport City had 5025, and Coventry had 1014.

Racial diversity is minimal in the project area. Most of Vermont is about 98 percent White. The Northeast Kingdom is no different. In St. Johnsbury, Blacks comprise 0.5%, Native American Indians around 0.7% and Asians around 0.6%. Irasburg is comprised of 98.9% White, and American Indian 1%. Coventry is 97.6% White, 0.3% Black, 1.5% American Indian and 0.4% Asian.

St. Johnsbury Substation is located over one-half mile southeast of the populated area. At Irasburg, the substation is not visible to any of the residents. The transmission corridor from Irasburg to Newport City (Mosher's Tap) is situated to the west of the small population centers in Irasburg and Coventry, with the exception of the houses along Alderbrook Road in Coventry. At Newport City, the transmission corridor touches only the most westerly corner of the municipality.

Franklin County, where the Highgate substation and St. Alban's Tap are located, is primarily rural. Some of the largest farms in the state are located here. It is also the third fastest-growing

county in the state. Growth continues to radiate out from the greater Burlington area, extending towards the Canadian border in Franklin County.

In 2000, Highgate had a population of 3397, and St. Albans Town had 5324. The ethnic composition on this side of the state is somewhat more diverse. Highgate has a white population of 92.9% with American Indian comprising 6.5%, Black and Asian at 0.2%. St. Albans has 97% white, American Indian 1.7%, Black at 0.6% and Asian at 0.5%. Highgate Substation is located to the east of the Highgate population center. The improvements in St. Albans Town lie approximately one mile east of the center of the municipality.

VELCO considered whether the project raises issues of environmental justice. It concluded that the project does not raise environmental-justice concerns, as discussed below.

Every substation and transmission line that will be affected by this project exists today. Anyone impacted by the project is already affected by the location of these substations or the existing line. VELCO selected the preferred corridor for and decided to make related, necessary improvements to substations serving what will become a looped transmission line, because locating the project at existing sites would minimize adverse impacts. VELCO states that it did not choose these locations to avoid non-minority or middle- and high-income populations that might oppose the project or increase easement-acquisition costs.

As stated in the next section, the areas served by the proposed project, especially the areas located in the Northeast Kingdom, lag the remainder of the state economically. One of the primary purposes of the project is to provide these areas with the same level of electric reliability that most of the rest of the state enjoys. Without reliable electric service, VELCO believes these areas will not have a chance to compete for new industries and businesses and could in fact risk losing existing ones.

The Northern Loop Project will provide that same level of reliability, and do so by using existing facilities, thereby minimizing environmental impacts to the degree possible.

3.5.3 Employment and Economics

The Northeast Kingdom's economy is the most challenged in the state with the highest unemployment levels. The number of jobs in the area has increased, but in spite of the increase there are only jobs for about 7 out of 10 persons in the labor force. This means that many residents pursue employment opportunities outside the region.

St. Johnsbury, in Caledonia County, employs 6047 people, with 58% in some type of service industry and 25% in manufacturing. Almost half the employers and employees for the area-wide labor market are in St. Johnsbury, as it is at the center of one of the two labor markets that serve the Northeast Kingdom. Coventry, Irasburg and Newport City are in Orleans County and employ 172, 190 and 4044 people, respectively.

The economies of Orleans and Caledonia Counties are closely connected to natural resources: logging and wood-products manufacturing have a significant share of the job opportunities. Caledonia County, however, provides a broader array of services and job opportunities.

Orleans County ranks third in the state in agriculture, and dairy farming makes up 85% of the agricultural sales. Orleans Country is also a leader in softwood logging and forestry, having 21.9% of the total state harvest.

Coventry can be categorized as an agriculturally-based bedroom community (in 1990, 77% of the town's work force were employed out of town). Its economic future is tied to the stability of its farming community as well as the growth of the commercial and industrial bases of its surrounding communities.

Newport City is the center of economic, educational and cultural activity for Orleans County. It depends on diverse economic bases: regional business and retail-shopping centers; industrial; tourism; and governmental. Newport is also economically tied to the bordering areas of the Province of Québec, attracting Canadians to its stores and as tourists to Jay Peak for skiing and Lake Memphremagog for recreation including boating.

Franklin County, the county that includes both Highgate and St. Albans, has the strongest job growth in the state with 2.5%. This growth is due to the close proximity to the major population concentration in the state (Burlington) and has been mostly in the service and retail trades.

Manufacturing has actually declined in the county. Franklin County is also one of the most significant agricultural areas of the state. Here, as with Orleans County, dairy farming makes up over 85% of all agricultural sales.

The Town of Highgate's economy is divided between agriculture and non-agricultural employment located in other communities. It is proximate to the local job markets of Swanton and St. Albans. In 1990, more than 80% of the work force working outside of Highgate, and that trend has continued.

St. Albans Town is in the midst of evolving from an agricultural community to one that supports seasonal, residential, commercial and industrial development. St. Albans is partially located along Lake Champlain, thus benefiting from the Vermont tourism trade. The State of Vermont's total labor force in 2001 was 334,700 with an unemployment rate of 3.6%. The unemployment rate for the towns in the northeastern part of the state is higher than the state-wide rate.

The labor force in St. Johnsbury in 2001 was 3850 with an unemployment rate of 5.7%. Irasburg had 560 in the labor force with unemployment at 6.7%. Coventry had 490 in the labor force and an unemployment rate of 3.9%. Newport City had a labor force of 2060 with unemployment running around 10.3%.

Highgate's total labor force in 2001 was 1610 with an unemployment rate of 5.3%. St. Albans, with strong economic ties to the Burlington metropolitan area, had 3120 in the work force with an unemployment rate of 1.3%.

3.5.4 Housing

In 2000, the Town of St. Johnsbury had a total of 3482 housing units. Of these, 1802 are owner-occupied and 40 are seasonal rentals. The remaining are rentals ranging from senior housing to apartments with anywhere from 2 units to 47 units. St. Johnsbury has actually seen a small decline in housing units: in 1990, there were 3487 housing units available.

Irasburg experienced a 30% jump in housing from 1990 to 2000 with 493 housing units available in 2000. 331 are owner-occupied, 60 are seasonal, and the remainder is rentals.

Coventry also saw an increase in available housing with 283 units in 1990 and 435 available in 2000. 306 units were owner-occupied, 38 were seasonal and the remainder was rentals.

Newport City had an increase of 10% from 1990 to 2000, with housing units growing from 2128 to 2342. 1098 are owner-occupied, 145 are seasonal and the remaining are rental units.

In Highgate, the total number of housing units increased from 1247 in 1990 to 1375 in 2000 with 965 being owner-occupied, 134 seasonal, and the rest rental.

St. Albans experienced growth as well, with 2115 housing units available in 1990 and 2257 available in 2000. Of those, 1529 are owner-occupied, 384 are seasonal, and the remainder is rental units.

Town	1990 Total	2000 Total	2000 Owner Occupied	2000 Rental	2000 Seasonal
St. Johnsbury	3487	3482	1802	1640	40
Irasburg	380	493	331	102	60
Coventry	283	435	306	91	38
Newport	2128	2342	1098	1099	145
Highgate	1247	1375	965	276	134
St. Albans	2115	2257	1529	344	384

3.5.5 Transportation

Interstates 91 and 93 are the major four-lane highways leading into the northeastern part of the project area. Both of these major highways run north and south. St. Johnsbury is at the junction of these two interstates and is served by four interstate exits (average annual daily traffic counts are 5500 for Interstate 93 and 10,000 for Interstate 91). While this provides economic benefits, it also results in a high amount of truck traffic that winds its way through the town. The most direct route from upstate New York to the cost of Maine, which is U.S. Route 2 to U.S. 302, also goes through St. Johnsbury. St. Johnsbury is also served by rail lines from two directions. A significant number of commercial properties are adjacent to the rail lines. The community is 75 miles away from commercial air traffic located in Burlington and 65 miles from a commuter-airline airport in West Lebanon, New Hampshire. There is a State airport in Lyndon (5 miles away) capable of handling private aircraft.

In Coventry, Interstate 91 runs the length of the town's eastern border but does not offer a town exit. The town center is located just off U.S. Route 5 (the average annual daily traffic count for Route 5 is 2000). Newport State Airport is located in Coventry, is capable of handling private aircraft, and plans to expand. There is no rail service to the town, but service is available in Newport. The Town of Irasburg is located at a junction of State Routes 14 and 58, both small State roads (and average annual daily traffic count of between 1600 – 2200). There is no local airport or any rail service to the town.

On the other side of the state, Interstate 89 passes through both St. Albans and Highgate, which links both communities to the region, to the state and to Canada. U.S. Route 7 is a major State-maintained arterial which parallels I-89 to the west; Route 7 experienced an average annual daily traffic of 1100 vehicles. At Highgate, the other major highway, State Route 78, a two-lane road, runs east-west and connects Interstate 89 with Highgate Center and State Route 207, a smaller, two-lane road (also called Gore Road); Route 78 experiences between 3600 and 4100 vehicles, approximately 40% more average daily traffic than Interstate 89. The Lamoille Valley Railroad and the Franklin County Airport are located in the Highgate area as well. Franklin County Airport is the region's sole public airport facility, serving private aircraft only.

For St. Albans, Interstate 89, U.S. Route 7, and State Routes 36, 104 and 105 all provide easy access to all parts of Franklin County and beyond. The Northwest Vermont Public Transit Network operates a public-transit system in Franklin County. Lake Champlain is a much-valued corridor for recreational boat traffic. The New England Central Railroad is located in St. Albans

and provides a means of moving both people (Amtrak) and freight. Please refer to the Vermont Agency of Transportation web site at http://www.aot.state.vt.us for more information.

3.5.6 Public Concerns

Beginning in 2001, VELCO met on numerous occasions with the planning commissions and selectboards of all of the potentially-affected towns. By letters dated May 28, 2002, and June 13, 2002, VELCO contacted the Coventry Planning Commission, the Northwest Vermont Regional Planning Commission, the Town of St. Johnsbury, the City of Newport, and St. Albans Town Planning Commission to provide them with the Northern Loop Project plans (see letters in Appendix D). Representatives of VELCO then met with the Northeastern Vermont Development Association on May 23, 2002, the Town of Highgate on June 3, 2002, the Town of Irasburg on June 10, 2002, the Town of Coventry on July 8, 2002, the Town of St. Johnsbury on July 17, 2002, and the Town of St. Albans on October 8, 2002. Refer to Table 3.3 below for the list of contacts.

On February 20, 2003, public site visits and a public hearing were held by the State of Vermont Public Service Board (see transcripts in Appendix B). No one from the public attended the site visits, but several people, including two landowners affected by the project, attended the public hearing. Their main concerns were the potential aesthetic impact of the new double-circuit line and possible electromagnetic field (EMF) health implications of the new lines.

Table 3-3

Phone Number	Town	Planning Commission Contact Person	Address
(802) 748-4331	St. Johnsbury (Caldonia County)	Priscilla Messier	1187 Main Street, Suite 2 St. Johnsbury, VT 05819
(802) 754-2242	Irasburg (Orleans County)	David Turner	P.O. Box 51 Irasburg, VT 05845
(802) 754-2288	Coventry (Orleans County)	Jeff Vinton	P.O. Box 104 Coventry, VT 05825
(802) 334-2112	Newport City (Orleans County)	Charles Elliott	222 Main Street Newport City, VT 05855
(802) 868-4697	Highgate (Franklin County)	James W. Pockette	468 Fortin Road (Home) Swanton, VT 05488 *or* P.O. Box 67 (Town Clerk) Highgate Center, VT 05459
(802) 524-2415	St. Albans Town (Franklin County)	Rebecca Perron	P.O. Box 37 St. Albans, VT 05481
Regional Planning Commissions			
(802) 748-5181	Northeastern Vermont Development Association (Covers: Caldonia, Essex & Orleans County)		Steve Patterson, Executive Director P.O. Box 630 St. Johnsbury, Vermont 05819
(802) 524-5958	Northwestern Regional Planning Commission (Covers: Franklin & Grand Isle County)		Ms. Catherine Dimitruk, Executive Director 7 Lake Street, Suite #201 St. Albans, Vermont 05478

3.6 Visual Resources

3.6.1 Landscape of the Study Area

Caledonia and Orleans Counties (St. Johnsbury, Coventry, Irasburg and Newport)

This region, known as the Northeast Kingdom, has an area of 2,027 square miles, representing 21% of the state. The land on the region's eastern border rises from the fertile Connecticut River valley up to the forested hills. In Caledonia and Orleans Counties, the land becomes a rural mosaic of farmland and forests with concentrated development in the river valleys. Gentle slopes and good soil sustain the farming.

The region has abundant clean water. Much of the region's western edge drains north and west as part of the Lake Champlain basin. There are more than 130 lakes and ponds concentrated in the region. The Clyde, Black, Barton and Willoughby Rivers, the main tributaries to Lake Memphremagog, run through the region. The topography of this region is discussed in Section 3.2.1.

The St. Johnsbury Substation is remote and not visible from either Interstate 93 or Higgins Hill Road (where it is located). Irasburg Substation is located off State Route 14, set back several hundred feet behind a densely vegetated hill. It is not visible from the roadway.

Franklin County (Highgate and St. Albans)

This area of the project is located wholly within the Champlain drainage basin and spans the 45th parallel. The landscape is either flat or rolling. Most of the countryside is rural agricultural land

with a few wooded areas, wetlands, lakes and rivers dotting the landscape. No mountains or hills in the area are over 200 feet. The topography of this area is discussed in Section 3.2.1.

The proposed Highgate Substation, located immediately off of State Route 78, would be a consolidation of the existing VELCO Highgate Substation and the former Citizens (now VELCO-owned) Highgate Substation. There will be a single-fence line and one access road, thus allowing for better screening from Route 78. Currently there is a heavy screen of brush along Route 78, including alders, poplars, ash and dogwood, with an interruption of the screen by the VELCO access drive. The tap modifications planned for St. Albans will not be visible by the public because of its remote location.

3.6.2 Corridor Landscape Description

The proposed (and existing) corridor is described in Section 2.1.1. VELCO plans to co-locate the new 115-kV circuit with the existing 48-kV circuit on single-pole structures and thus will replace the existing 6.47-mile, 48-kV transmission line with a 115-kV/48-kV line using double-circuit construction. The new line will be rebuilt approximately pole-for-pole along the alignment of the existing 48-kV line, except where impacts on sensitive areas (wetlands) can be minimized with selective placements of new poles. This new line is being designed for single wood, laminated-wood or Corten™ steel poles which are rust-inducing poles that blends well with the dark green of conifers and the brown of deciduous trees in winter.

In addition to co-locating its 115-kV circuit with the existing 48-kV circuit, VELCO proposes to use the existing 100-foot, transmission-corridor right-of-way, even though its general practice is to maintain a 150-foot ROW for 115-kV circuits. Co-locating the transmission circuits, while maintaining the same 100-foot ROW width, would minimize the need for additional screening.

3.7 Cultural Resources

3.7.1 Prehistoric Sites

At the time of European American contact, the Abenaki people inhabited the area from Maine to Vermont and much of the southern portions of the Province of Québec. Common patterns of settlement and subsistence, and the lack of identifiable replacement cultures in the archaeological record suggest that the Abenaki people have a long history within this region. Antecedents to the Abenaki are represented throughout the Holocene Period, with representative archaeological sites from the Paleo Indian Period (*ca* 11,000 to 9,000 Years Before Present (YBP)), the Archaic Period (ca 9,000 to 3,000 YBP), and the Woodland Period (3,000 to 250 YBP). Descendants of the pre-European contact Abenaki still live throughout this region, in both organized Native villages (Odanak and Wolinak, First Nations reserves in Québec), and as enclaves within various cities and towns throughout New England (e.g., Swanton and Highgate, Vermont).

Prior to 20,000 years ago, up to three-kilometer-thick glacial ice covered New England. During the next 4,000 to 5,000 years, this glacial mass stagnated and underwent a process of melting, punctuated by relatively brief periods of glacial advancement. As the glaciers melted and the valley ice began to retreat, ice- and till-impounded lakes of meltwater formed.

Meltwater from glaciers around the world flowed into the oceans, resulting in the steady rise of sea levels relative to the land. By about 14,000 calendrical years ago, the rising sea levels filled the Saint Lawrence, Great Lakes and Champlain Basins to form a large estuary know as the Champlain Sea. Four phases of the Champlain Sea have been defined through the identification of relict beach terraces: Champlain Sea Maximum, Pre-Port Ken, Port Kent, and Burlington phases.

Glacial lakes, saltwater estuaries, and freshwater lakes emerged from these conditions. Meltwaters from glacial ice in adjacent valleys carried gravels, sands, silts, and clay sediments, which settled in lake basins and mantled bedrock and tills. Rivers then eroded glacial outwash, ice contact features, and former glacial lake sediments. The rivers transported these eroded sands, silts, and clays to the saltwater estuary and later freshwater bays. As the levels of the glacial lakes and saltwater estuary dropped with the retreating ice, the newly-exposed sediment deposits co-evolved with microbial and vegetative communities into a mosaic of soils.

These emergent landscapes did not present a flat and uniform surface. Numerous small lakes and ponds would have remained separated from the major lakes and estuaries within this undulating landscape, and surrounding soils would have supported vegetative communities appropriate to the climatic regime of the time period and topographic position. In general, the time depth for Native American occupation in northern Vermont runs throughout the Holocene Period, from roughly 11,000 years before present down to the present.

St. Johnsbury and Irasburg to Mosher's Tap Corridor:

This segment of the project falls within the borders of Drainage Basin 17 (Scharoun and Bartone, 2002), which includes Lake Memphremagog and its tributaries. Lake Memphremagog shorelines include bays and associated wetlands. These lake-associated wetlands, along with several existing and former smaller lakes, produce a wider variety and greater abundance of flora and fauna than any other ecological environment. As such, many archaeological sites may be associated with these freshwater marsh communities, given the high density of potential resources available most of the year.

However, no Native American sites have been recorded within the transmission-line corridor from Irasburg to Mosher's Tap. The closest-recorded sites are to the west on the South Bay of Lake Memphremagog (Frink, 2002). Pre-European Native American subsistence strategy consisted of a scheduled, seasonal movement about extended family territories. Within these territories, some high-yield areas, such as South Bay for fish, fowl, and grains, would be reoccupied virtually every year. Lower-yield areas, such as small (less-than-100 acre) deer yards, would have been used in rotation with other similar niches across the territory. As such, they might be occupied once or twice per generation.

There were 20 locations within the project corridor identified by the University of Maine at Farmington (UMF) that could be considered archaeologically sensitive for Native American sites (Appendix F). Paleo-lake-predictive models that Archaeological Resource Assessment (ARA) developed produced good examples of possible site types (See UMF and ARA studies in Appendix F).

Highgate and St. Albans:

Prehistoric man camped along the edge of the Champlain Sea. Rivers running into the sea-formed deltas, and as the Champlain Sea retreated these deltas were probably occupied by prehistoric man. Man could have occupied this area as early as 10,600 years ago. The glacial-outwash deltas of rivers most likely supported small to moderate-sized processing camps and kill spots by Native Americans. The forests that occur in soils that form in riverbank deposits, along primary mature rivers with relatively broad floodplains, would support moderate to large processing sites and long-duration encampments due to the diversity of potential resources. Small kill and resource-gathering sites are also likely to be present.

At Highgate, a widely diverse, low-density concentration of floral and faunal resources would predict early Native American site locations, small to medium-sized seasonal-hunting and gathering and resource-processing sites. The closest known site to the substations is located 1150 feet away. This Native American site, found in 1984, dates back to the Late Archaic to Early Woodland period (between 6000 and 2000 BC). Two other sites have been found within 1.2 miles of the two substations. (See ARA report in Appendix F).

The St. Albans parcel lies on bedrock classified as Parker Slate and Dunham Formation. The Dunham Formation dolostone is known to have been used by early Native Americans for ground stone tool production. The surrounding, oak-ash-hickory, northern-hardwoods-forest communities would have attracted a variety of game, thus encouraging small- to moderate-sized Native American processing camps and kill spots.

Mitigation measures are described in Section 4.3.7.

3.7.2 Historic Sites

St. Johnsbury and the Irasburg-to-Mosher's Tap Corridor:

Three transportation routes existed in this area prior to Euroamerican settlement. One, the Missisquoi River, flowed westward to Lake Champlain and the influential Abenaki settlement in Swanton. Another route was along the Clyde River, and the third route utilized Lake Memphremagog's outlet in Canada, the Magog River.

The Euroamerican settlers starting arriving in the late 1770s. Traders, military and travelers utilized a road that followed the Black River to its outlet at Lake Memphremagog in the present day vicinity of Newport. This area became a trading center, and the Abenakis from the upper Lake Champlain Basin settled along the shores and tributaries. In the late 1700s, the townships of Irasburg and Coventy were established, and in the early 1800s Newport was chartered. In spite of a rich Euroamerican history in this general area, no known European American archaeological sites within the project corridor are recorded in the Vermont Archaeological Inventory (VAI). The closest site is located on Lake Memphremagog's western shore in Newport (UMF, 2002).

Archival maps were studied to determine the probability of encountering additional European American archaeological sites within the project corridor. F.W. Beers, in the late nineteenth century, published county-wide atlas maps of Vermont. Beers' (1878) Orleans County maps provide a useful overview of historic settlement patterns near the project corridor. Some of the

properties shown on the Beers maps may no longer stand above ground but do exist as archaeological properties.

Structures that once stood prior to 1859 or were built after 1925, but may not remain today (as archaeological sites), are not individually identified in this preliminary survey of the project corridor. Additionally, significant archaeological information may exist in association with historic properties that retain standing structures.

Two locations within the project corridor were identified by the UMF team. In Coventry, there are the remnants of a small cellar hole on the edge of the right-of-way. Cultural deposits related to the cellar hole may be located within the project corridor.

At another location west of Stony Brook in Coventry, a road and a stone foundation related to a sawmill were found.

Highgate and St. Albans:

Highgate was chartered as a New Hampshire town in 1763. The first settlers were the Dutch and Germans in the 1780s. Although the local population developed a number of industrial enterprises due to waterpower and an agricultural/ manufacturing village evolved, the parcel of land for this project appears to have only been used for agricultural purposes. As an interesting sidenote, the project is located along the historic overland route (Route 78) that was probably

used by farmers and others from as far away as the Northeast Kingdom to transport goods to Missisquoi Bay and the Montreal market (UMF, 2002).

In the vicinity of the two Highgate substations, the VAI were reviewed for documented European American sites near or within the proposed substation area. No European American sites were near. Historic Beers and other maps were also reviewed, and again no former or existing European American structures were located with the proposed project's boundary. The closest recorded European American site is located 2420 feet away at Highgate Falls.

No European American sites, former or existing, are known to exist at the St. Albans project site.

With regard to historic structures in the project area, ARA consulted the 2002 updated listing of the The National Register (NR)'s online database (NRIS) on NR-eligible sites. They found only three properties anywhere near proximate to the project area in the Northeast Kingdom. One property was well to the south, one in the next valley to the east, and one over the hill in Newport. None of these NR-eligible properties are within the view shed of the northeast portion of the Northern Loop Project. No NR-eligible properties were found to be within the Highgate or St. Albans area, either (Frink, 2004).

3.7.3 Paleontological Sites

There are no identified paleontological sites in the project area. There is a sedimentary sequence of Ordovician age in the Chaplain lowlands, and this sequence does have some fossil remains.

However, it is not considered a particularly rich environment. (Frink, 2002). No areas identified as geologically unique because of their paleontological qualities have been identified. This suggests that the project area has few, if any, sites of paleontological significance.